

I Claim:

1 1. A clean-in-place agitator arrangement for agitating the contents of a sanitary
2 tank, said tank having an outer wall, with drive means for the agitator arrangement
3 being disposed outside the tank outer wall; the arrangement comprising
4 a drive shaft;
5 a shaft housing supported in said tank wall and extending from an exterior of
6 said wall to an interior of said tank wall, said shaft housing supporting said drive
7 shaft so that a proximal end thereof extends out an end of the shaft housing exterior
8 of said tank wall and a distal end thereof projects out another end within said tank,
9 said shaft housing having a hollow interior defining an open annulus between the
10 housing and the drive shaft; said shaft housing including means for admitting a
11 cleaning solution under pressure into said open annulus; and
12 an impeller mounted on the distal end of said shaft;
13 said shaft housing further including a pair of lip seals disposed over said
14 drive shaft at the ends of said shaft housing, respectively, and each said lip seal
15 having an annular lip that extends along said shaft in the distal direction, so that
16 when said cleaning fluid is applied through said means for admitting, the fluid
17 passes the lip of the lip seal at the interior end of the shaft housing, so that the fluid
18 sprays against a proximal side of said impeller.

1 2. The clean-in-place agitator arrangement of Claim 1 wherein the distal end of
2 said drive shaft has a non-round portion, and said agitator has a center opening of a
3 profile matching the non-round portion, so that the agitator is held in place on said
4 drive shaft to rotate with the shaft, without welding and without threaded fasteners.

1 3. The clean-in-place agitator of Claim 1 wherein said drive shaft distal end has a
2 non-round portion at a tip thereof, and second non-round portion proximal of said tip
3 and spaced therefrom by a round shaft portion.

1 4. The clean-in-place agitator of Claim 1 wherein said shaft housing is tilted
2 downward so that fluid inside the housing drains in the proximal direction.

1 5. The clean-in-place agitator of Claim 1 wherein said lip seal surrounds said shaft
2 and projects along the shaft only in the distal direction.

1 6. A vertical shaft agitator arrangement for agitating the contents of a sanitary tank,
2 said tank having a top, with drive means for the agitator arrangement being disposed
3 above the top of the tank; the agitator arrangement comprising

4 a vertical drive shaft having an upper end in rotational contact with said drive
5 means, and having a non-circular cross section with at least two opposed flat sides;

6 said drive shaft having at least one pair of grooves disposed respectively on
7 said opposed flat sides and extending parallel to one another and traversing said flat
8 sides; and

9 at least one impeller blade having a pair of ears that define a cutout
10 therebetween that is dimensioned to fit over said vertical drive shaft with facing
11 edges of said ears fitting slidably into respective ones of said pair of grooves, and
12 with a portion of at least one of said ears being bendable to retain said impeller
13 blade removably on said drive shaft.

1 7. A vertical shaft agitator arrangement according to Claim 6 wherein said shaft
2 has a square cross section.

1 8. A vertical shaft agitator arrangement according to Claim 7 wherein said shaft
2 has a plurality of pairs of grooves formed thereon.

1 9. A vertical shaft agitator arrangement according to Claim 8 wherein at least some
2 of said pairs of grooves are disposed on first and third sides of said shaft, and others
3 of said pairs of grooves are disposed on second and fourth sides thereof.

1 10. A vertical shaft agitator arrangement according to Claim 6 wherein said at least
2 one pair of grooves are oriented at a sloping angle across said vertical shaft.

1 11. A clean-in-place agitator arrangement for agitating the contents of a sanitary
2 tank, said tank having an outer wall, with drive means for the agitator arrangement
3 being disposed outside the tank outer wall; the arrangement comprising

4 a drive shaft;

5 a shaft housing supported in said tank wall and extending from an exterior of
6 said wall to an interior of said tank wall, said shaft housing supporting said drive
7 shaft so that a proximal end thereof extends out an end of the shaft housing exterior
8 of said tank wall and a distal end thereof projects out another end within said tank,
9 said shaft housing having a hollow interior defining an open annulus between the
10 housing and the drive shaft; said shaft housing including means for admitting a

11 cleaning solution under pressure into said open annulus, and means at a distal end
12 of said shaft housing permitting said cleaning solution to spray in a distal direction;
13 and

14 an impeller mounted on the distal end of said shaft;

15 wherein the distal end of said drive shaft has a non-round portion, and said
16 agitator has a center opening of a profile matching the non-round portion, so that
17 the agitator is held in place on said drive shaft to rotate with the shaft, without
18 welding and without threaded fasteners.

1 12. The clean-in-place agitator of Claim 11 wherein said drive shaft distal end has
2 a non-round portion at a tip thereof, and second non-round portion proximal of said
3 tip and spaced therefrom by a round shaft portion.